

If the World Were Our Classroom

Brief Overview:

Using the picture book, *If the World Were a Village* by David J. Smith, students will gather similar research from their classroom to create their own book. Students will use the activities to practice data collection and graphing skills. Final graphs will display statistics and an analysis of results taken from two different classrooms.

NCTM 2000 Principles for School Mathematics:

Equity: *Excellence in mathematics education requires equity - high expectations and strong support for all students.*

Curriculum: *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*

Teaching: *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*

Learning: *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*

Assessment: *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*

Technology: *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

Content Standards

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems.

Data Analysis and Probability

Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them; collect data using observations, surveys, and experiments; and represents data using tables and graphs such as: line plots, bar graphs, and line graphs.

Select and use appropriate statistical methods to analyze data; describe the shape and important features of a set of data and compare related data sets, with an emphasis on how data are distributed; use measure of center, focusing on the median and understand what each does and does not indicate about the data set; and compare different representations

of the same data and evaluate how well each representation shows important aspects of the data.

Develop and evaluate inferences and predictions that are based on data; and propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.

Process Standards

Problem Solving

Instructional programs from pre-kindergarten through grade 12 should enable all students to build new mathematical knowledge through problem solving; solve problems that arise in mathematics and in other contexts; apply and adapt a variety of appropriate strategies to solve problems; and monitor and reflect on the process of mathematical problem solving.

Reasoning and Proof

Instructional programs from pre-kindergarten through grade 12 should enable all students to recognize reasoning and proof as fundamental aspects of mathematics; make and investigate mathematical conjectures; develop and evaluate mathematical arguments and proofs; and select and use various types of reasoning and methods of proof.

Communication

Instructional programs from pre-kindergarten through grade 12 should enable all students to organize and consolidate their mathematical thinking through communication; communicate their mathematical thinking coherently and clearly to peers, teachers, and others; analyze and evaluate the mathematical thinking and strategies of others; and the language of mathematics to express mathematical ideas precisely.

Connections

Instructional programs from pre-kindergarten through grade 12 should enable all students to recognize and use connections among mathematical ideas; understand how mathematical ideas interconnect and build on one another to produce a coherent whole; and recognize and apply mathematics in context outside of mathematics.

Representation

Instructional programs from pre-kindergarten through grade 12 should enable all students to create and use representations to organize, record, and communicate mathematical ideas; select, apply, and translate among mathematical representations to solve problems; and use representations to model and interpret physical, social, and mathematical phenomena.

Links to National Science Education Standards:

Science in Personal and Social Perspectives

Students will examine populations, resources, and environments as well as science and technology in society.

Grade/Level:

Grades 3-5

Duration/Length:

Four to six days.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Bar graphs
- Line plot graph
- Tally chart/frequency table
- Friendly letter format
- How to analyze and interpret a graph

Student Outcomes:

Students will:

- Count and record data on a tally Sheet.
- Design a graph to visually represent information.
- Make predictions about the relationship between class and world results.
- Present information in a visual format.
- Analyze, compare, and interpret data.
- Write to evaluate data comparison

Materials/Resources/Printed Materials:

- If the World Were a Village* by David J. Smith
- Pencils and paper
- Construction paper (cover of book)
- Markers and crayons
- Laminator (optional)
- Another class
- Binding machine
- Spiral combs
- Student Resource Sheets # (1-9) and Teacher Resource Sheets # (1-3)
- Rulers
- Scissors
- Chart paper

Development/Procedures:

Teacher Preparation

1. Look over *We Want To Know* (Student Resource Sheet # 1). Determine if these are the polling questions you wish to use.

If Not:

- a. Use *Category Options* (Teacher Resource Sheet # 1) for other topics you might wish to poll.
 - b. Create your own *We Want To Know* to include your chosen topics.
2. If possible, partner with another class to enable comparison of data.
 3. Possible homework/activity for students that finish early: design a cover for the class book. Teacher discretion used for final selection of cover.

Day 1

1. Read *If the World Were a Village* by David J. Smith. Discuss the information presented and the possible methods of data collection.
2. Introduce vignette, *If the World Were Our Classroom* (Teacher Resource Sheet # 2).
3. Distribute *We Want to Know* (Student Resource Sheet # 1), discuss poll questions, and have students complete poll.
4. Collect student polls.

Day 2

1. Distribute checklist (Student Resource Sheets # 4a and 4b) and discuss the differences between a bar graph and a line plot graph using the checklist as a resource.
2. Ask students when a bar graph is more appropriate. Highlight that a bar graph uses categories and a line plot is only numbers. Use a student generated poll question (Example: Favorite color) to poll the class. Have the students use the checklist, *Do You Have What it Takes*, (Student Resource Sheet # 4a) to help the teacher create a bar graph.
3. Poll students' shoe size and mark tallies on a transparency of *Tally Ho!* (Student Resource Sheet # 2). Discuss which graph would be more appropriate. Then have the students use the checklist, *Do You Have What it Takes*, (Student Resource Sheet # 4b) to help the teacher create a line plot graph.
4. Divide students into small groups based on number of categories polled. Assign one category to each group.

5. Have groups tally the data for their specific question using *Tally Ho!* (Student Resource Sheet # 2).
6. Small groups discuss which graph (line plot or single bar) would best display the data.
7. Groups present their graphing decision to class explaining why it is the best data display. Class critiques each group's decision, making suggestions when appropriate.
8. Groups complete a rough draft of graph using the single graphing Sheet #s (Student Resource Sheets # 3a and 3b).
9. Students complete the appropriate checklist on *Do You Have What it Takes*, (Student Resource Sheets # 4a and 4b) verifying they have included all aspects for that graph.
10. Graphs and checklists are collected for teacher review.

Day 3

*If not comparing class data with other data, create a second set of data for each category.

1. Model double bar graph/ double line plot using graphs modeled on **Day 2**. Use fabricated data for comparison. Then have the students use the checklist (Student Resource Sheets # 5a, 5b) to help the teacher create a double bar graph and double line plot graph.
2. Discuss with students different ways to analyze and interpret data using graphs.

Refer to Sample Questions (Teacher Resource Sheet # 3). Have students orally make comparisons and draw conclusions about both sets of data.

3. Distribute data that will be used for comparison (another class' tally Sheets, fabricated information, data from Smith book, etc.) Also distribute Double Graph Checklist (Student Resource Sheets # 5a, 5b).
4. Using the data from Day 2 and the data distributed in step 3, students create a rough draft of the double bar graph/line plot on the double graphing Sheet #s (Student Resource Sheets # 3c and 3d) to compare data within their category.
5. Groups write a paragraph (on notebook paper) analyzing and interpreting their data.
6. Students complete the checklist, *Do You Have What it Takes*, (Student Resource Sheets # 5a, 5b).
7. Graphs and checklists are collected for teacher review.

Day 4

1. Distribute graphs and checklists from Day 3. Teacher meets with groups as necessary to discuss changes.
2. Teacher models layout of data for final class book copy. Use Final Written Analysis (Student Resource Sheet # 6), Illustrator's Masterpiece (Student Resource Sheet # 7), and the double graphing Sheets (Student Resource Sheets # 3c and 3d) to model how to create the final copy.
3. Within groups, assign each student a role in completing the final pages (Example: Illustrator, Analysis Writer, Graphic Designer, etc.). Give each role the appropriate final layout piece.
4. Groups complete final copy referring to Double Graph Checklist (Student Resource Sheets # 5a, 5b).
5. Teacher collects final copies to assemble book.

Day 5

1. Teacher presents completed book to class. Each group presents their pages and discusses their findings.
2. Revisit vignette and discuss whether or not a single classroom could represent the entire world. Review friendly letter format, and distribute/discuss rubric for scoring the letter (Student Resource Sheet # 8).
3. Each student will write a friendly letter to David J. Smith that states his or her opinion. Students will support their opinion with the data displayed in the class book. Use World Border Paper (Student Resource Sheet # 9) for letters.
4. Teacher collects letters and rubric.

Performance Assessment:

Continuous assessment throughout all activities using teacher observation.

Accuracy in completing the single and double line plots and bar graphs.

Assessment using the checklist (Student Resource Sheet # 4) for scoring the single line plots graph and bar graph.

Assessment using the checklist (Student Resource Sheets # 5a, 5b) for scoring the double line plot/bar graph and analysis and interpretation of data.

Assessment using the rubric for scoring the friendly letter (Student Resource Sheet # 7).

Extension/Follow Up:

Add an additional set of data to compare.

Use stem and leaf plots to display line plot data.
Use box plots to display line plot data.

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We Want To Know...

Directions: Circle the answer that best applies to you.



1. In what month were you born?

- 1-Jan. 2-Feb. 3-Mar. 4-Apr. 5-May 6-Jun.
7-Jul. 8-Aug. 9-Sep. 10-Oct. 11-Nov. 12-Dec.

2. How many televisions do you have in your home?

- 0 1 2 3 4 5 6 other: _____



3. What is your favorite pizza topping?

- plain cheese pepperoni sausage mushroom other

4. How many people live in your home (including yourself)?

- 2 3 4 5 6 7 8 9 10 other: _____



5. What is your favorite subject in school?

- Math Reading Social Studies Science Writing



Category Options

Category	Best Fit Graph
Nationalities	Bar Graph
Religions	Bar Graph
Favorite _____	Bar Graph
Birth Month	Line Plot or Bar Graph
# of Years at School	Line Plot
Shoe Size	Line Plot
#of _____ in Household	Line Plot
Gender	Bar Graph
Height	Line Plot



Our Category: _____

[illegible]



David J. Smith, the author of *If the World Were a Village*, has been asked to write a sequel to the original book. This time, however, he would like to base his data on a classroom. Our task is to research whether a single classroom can represent the world. He would like us to send him a letter reporting our findings.

Small groups will first collect the data needed from students in our class and display it on a graph. We will then study the data and compare it to the original book and another class. David J. Smith will use our results to decide if this book would provide an accurate picture of the world.

[illegible]

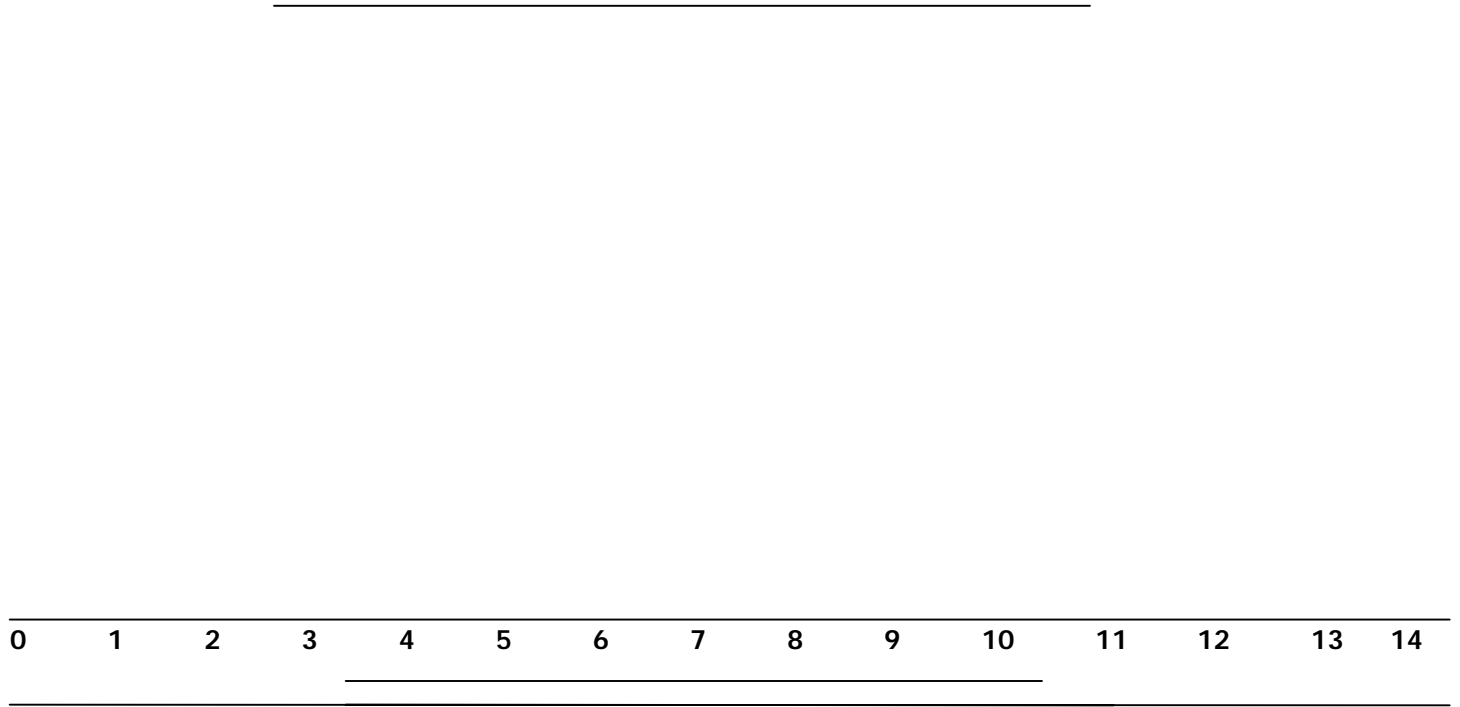
Student Resource Sheet # 3b

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

A full-page sheet of white graph paper featuring a uniform grid of thin black horizontal and vertical lines. The grid consists of 20 columns and 20 rows, creating a total of 400 small squares. There are no margins, text, or other markings on the page.

Key: ☐ ☐

Student Resource Sheet # 3d



Sample Questions

(for analyzing and interpreting data)

What are similarities that you can find between the two sets of data?

What are differences between the two sets of data?

Looking at the data, can you make any comparison statements using the following words: most, all, only, none?

What conclusions can you draw based on the two sets of data?
For example (favorite pizza topping): If we were going to have a pizza party for both classes we should order pepperoni because most people prefer pepperoni pizza.





Do You Have What it Takes?

(bar graph checklist)

Criteria	Yes	No
Does your graph have a title?		
Are both axes labeled appropriately?		
Does your y-axis have an appropriate scale?		
Are the items for your x-axis labeled?		
Are all of the bars the same width?		
Are all of the bars evenly spaced?		

Do You Have What it Takes?

(line plot checklist)



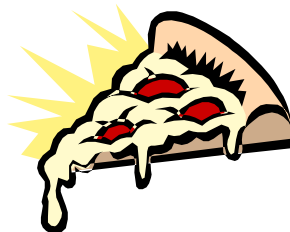
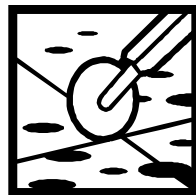
Criteria	Yes	No
Does your line plot have a title?		
Is the number line labeled appropriately?		
Does your number line extend beyond your smallest and largest values?		
Are your X's equally sized?		
Are your X's plotted evenly?		

Left-Side of Book Page

Data Analysis Paragraph

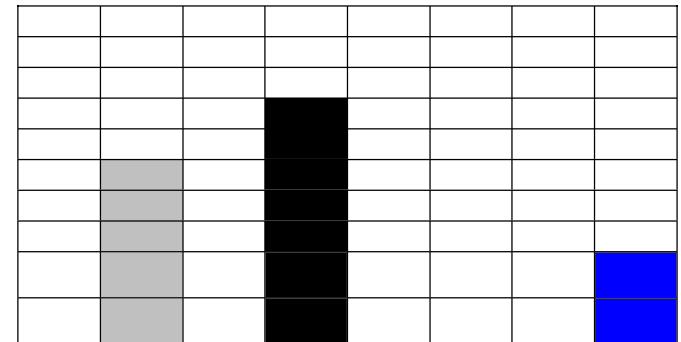
[illegible]

Illustration (spine)



Right-Side of Book Page

Graph





Do You Have What it Takes?

(double bar graph checklist)

Criteria	Yes	No
Does your graph have a title?		
Are both axes labeled appropriately?		
Does your y-axis have a scale appropriate for both sets of data?		
Are the items for your x-axis labeled?		
Are all of the bars the same width?		
Are all sets of bars evenly spaced?		
Have you chosen a color to represent each set of data and included a key?		
Have you written comparisons between both sets of data?		

Do You Have What it Takes?

(double line plot checklist)



Criteria	Yes	No
Does your line plot have a title?		
Is the number line labeled appropriately?		
Does your number line extend between your smallest and largest values for both sides?		
Are your X's equally sized?		
Are your X's plotted evenly?		
Have you written comparisons between both sets of data?		

Student Resource Sheet # 6

[illegible]

Illustrator's Masterpiece

Directions:

Use the space in the backwards "L" to illustrate the topic that your group researched. When you have finished your illustration, cut it out. It will be glued onto the page with your group's written analysis.

Be neat, but colorful!

Only the drawings inside
the backwards "L" will be
included.

Directions:

Use the space in the backwards "L" to illustrate the topic that your group researched. When you have finished your illustration, cut it out. It will be glued onto the page with your group's written analysis.

Be neat, but colorful!

Only the drawings inside the backwards "L" will be included.



Writing Rubric

Criteria	Score
<ul style="list-style-type: none">• Correct friendly letter format -heading, greeting, closing• Uses at least 3 examples of data to compare results and determine whether or not a class could represent the world• Uses math vocabulary correctly in comparisons	3
<ul style="list-style-type: none">• Letter format used• Uses two examples of data to compare results and determine whether or not a class could represent the world• Uses some math vocabulary correctly in comparisons	2
<ul style="list-style-type: none">• Letter format used• Uses one or no examples of data to compare results and determine whether or not a class could represent the world• Uses little or no math vocabulary correctly in comparisons	1

